

CHAPTER 7

OTHER DESIGN CONSIDERATIONS

7-1. Water source

All treatment systems will require a reliable source for charging the CVWF initially and for make-up, regardless of the form of secondary treatment. The volume of water required will depend on the type of wash facility constructed, type and configuration of the treatment system, frequency of use, losses, and the local climate. If a recycle system is provided, the designer must determine the most feasible and economical method of filling the system initially, and then maintaining the water level in the system by adding makeup water from the water source. Makeup water will be required to restore the system to a working level as water is carried off by the vehicles or lost to evaporation and overspray. All original source and makeup water should be added at the water supply basin, if provided. This water should be uncontaminated, reasonably clean, and should not require treatment before being introduced into the system. All sources of water available at the installation should be considered for use, singly or in combination, as sources of water at a CVWF including dedicated wells, surface water, tapping into the existing potable water supply or captured rainwater.

- a. *Type of facility.* A wash facility that has a prewash will require more makeup water than a facility with only wash stations because of increased water lost by vehicle carry-off, overspray and evaporation. Water losses from carry-off can be as high as 160 gallons per vehicle. Losses due to overspray and evaporation can be as high as 10 percent from water cannons and 5 percent from hoses at wash stations.
- b. *Type and configuration of treatment system.* The type and configuration of the treatment system is another factor to consider when estimating the volume of makeup water required. A discharge system will require that the total water demand including makeup be taken from the developed water source. In a recycle system, only the water lost to overspray, evaporation and vehicle carry-off will need to be replaced from the water source. Treatment systems with basins that have large surface areas may have greater water losses due to evaporation than basins with smaller surface areas. This loss will increase the volume of makeup water required, as discussed below.
- c. *Climate.* The evaporation rate at the installation must be considered when calculating the volume of make-up water needed to maintain the total demand. The volume of rainfall at the installation as well as the amount lost to evaporation should be calculated to determine the volume of water needed from the water source. Water balance computations should be performed by the designer to assure adequate

supplies of water throughout the entire washing season.

7-2. Piping

Wastewater should be conveyed by gravity whenever possible for economy. Pumping should be avoided because residual oils may become emulsified and difficult to remove, solids cause wear on pumps and pumps add significant capital and operating costs to the facility. Conveyances, whether gravity sewers or open channels, must be constructed to grades which will provide adequate scouring velocity to prevent solids deposition. All pipes must be designed for peak hydraulic and solids loadings, including that contribution from stormwater runoff from hardstands. Because of the external and internal abuse and because of inaccessibility, piping systems must be durable. Leakage or infiltration allowances normally associated with gravity piping should not be used; gravity lines should be water tight. Other factors such as soil corrosion and freeze protection need to be addressed also. Open-channel flow should be used whenever possible for ease of maintenance. If siting problems or severe slopes make open-channel flow impractical, the designer should use large-diameter pipes. Locate manholes at each change in slope or direction and at each pipe intersection. Design long, straight sections of conduit to minimize the number of manholes required. All frequently operated, buried valves should be accessible through pits or manholes.

7-3. Hoses, water cannons, and nozzles

Hoses must be of a size and weight which a person can handle, but yet be durable enough to withstand the abuse of repetitive use, vehicular traffic, and internal abrasion from fines in the water. Nozzles and water cannons undergo similar treatment. The industry is lacking for equipment that can stand up under the continuous use given at a CVWF; therefore the designer must be very selective when selecting hoses, water cannons and nozzles.

7-4. Control systems

The process controls for a CVWF can be very complex to a Contractor who has never seen a wash facility. Material specifications for controls are standard. The logic of the control system is special to the design. It is very important that the designer clearly describe within the plans and specifications how the components are to function.

7-5. Systems operating manual

Complete manuals should be prepared by the designer describing the various components of the CWF and how they were designed to be used. The manual should establish standard operating procedures including staffing, scheduling, safety, records keeping, and other operational responsibilities. All the control systems should be illustrated and step-by-step

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instructions provided for not only standard procedures, but also special procedures. The manual should also establish maintenance responsibilities for all the elements in the CVWF. Preventive maintenance will be performed by the operators. Tools for their use must be made available along with spare parts for critical items. Training of operators is very important. Providing them with the written documents previously de-

scribed is a start, but the best training can be done through hands-on operation under the instruction of the designer. The amount of training time will depend on the size and complexity of the CVWF, whether it has a prewash and whether it has a recycle water system. For the simplest CVWF, training could be accomplished in a day; for the most complex, the training period could be up to a week.